CLAIMS

1. A method for extending a directory schema independent of schema modification, the method comprising:

instantiating an object instance of a content class comprising a flexible attribute that is based on a complex data type, the object instance being created in a directory based on the directory schema, the content class and flexible attribute being defined in the directory schema; and

assigning a property to the attribute, the property being operational or data providing in nature, the property having a data type that is independent of the complex data type.

2. A method as recited in claim 1, wherein the directory schema is independent from any values that the object instance may store.

3. A method as recited in claim 1, wherein the complex data type is an XML data type.

4. A method as recited in claim 1, wherein the first property is described by an XML string, the XML string being compatible with the complex data type.

5. A method as recited in claim 1, wherein the first property is described by an XML string, the XML string being compatible with the complex data type.

6. A method as recited in claim 1, wherein the directory schema defines a plurality of object classes for a versioning aware directory.

7. A method as recited in claim 1, wherein the object instance is a first object instance, wherein the property is the first property comprising a particular number of data elements, and wherein the method further comprises:

independent of directory schema modification:

(a) instantiating a second object instance of the content class, the second object comprising a second flexible attribute that is based on the complex data type;

(b) assigning a second property to the second flexible attribute, the second property having a different number of data elements than the first property; and

(c) wherein each data element in the first and second properties comprises data such neither the first or second properties contribute to data sparsity of a directory based on the directory schema.

8. A method as recited in claim 1, wherein the object instance is a first object instance, wherein the property is the first property, and wherein the method further comprises:

without modifying the directory schema, instantiating a second object instance of the content class, the second object comprising a second flexible attribute that is based on the complex data type; and

assigning a second property to the second flexible attribute, the second property being completely independent of any operational or data characterisitics of the first property.

9. A method as recited in claim 8, wherein the first and second properties are described by respective XML strings that are compatible with the complex data type.

10. A server comprising:

a processor coupled to a memory, the memory comprising computer executable instructions, the processor being configured to fetch and execute the computer-executable instructions for:

instantiating an object instance of a content class comprising a flexible attribute that is based on a complex data type, the content class and flexible attribute being defined in a directory schema; and

assigning a property to the attribute, the property being operational or data providing in nature, the property having a data type that is independent of the attribute's data type.

11. A server as recited in claim 10, wherein the directory schema is independent from any values that the object instance may store.

12. A server as recited in claim 10, wherein the complex data type is an XML data type.

13. A server as recited in claim 10, wherein the first property is described by an XML string, the XML string being compatible with the data type.

14. A server as recited in claim 10, wherein the directory schema defines a plurality of object classes for a versioning aware directory.

15. A server as recited in claim 10, wherein the object instance is a first object instance, wherein the property is the first property comprising a particular number of data elements, and wherein the computer-executable instructions further comprise instructions for:

independent of directory schema modification:

(a) instantiating a second object instance of the content class, the second object comprising a second flexible attribute that is based on the complex data type;

(b) assigning a second property to the second flexible attribute, the second property having a different number of data elements than the first property; and

(c) wherein each data element in the first and second properties comprises data such neither the first or second properties contribute to data sparsity of a directory based on the directory schema.

16. A server as recited in claim 10, wherein the object instance is a first object instance, wherein the property is the first property, and wherein the computer-executable instructions further comprise instructions for:

without modifying the directory schema, instantiating a second object instance of the content class, the second object comprising a second flexible attribute that is based on the complex data type; and

assigning a second property to the second flexible attribute, the second property being completely independent of any operational or data characterisitics of the first property.

17. A server as recited in claim 16, wherein the first and second properties are described by respective XML strings that are compatible with the complex data type.

18. A computer-readable medium comprising computer-executable instructions for:

instantiating an object instance of a content class comprising a flexible attribute that is based on a complex data type, the content class and flexible attribute being defined in a directory schema; and

assigning a property to the attribute, the property being operational or data providing in nature, the property having a data type that is independent of the complex data type.

19. A computer-readable medium as recited in claim 18, wherein the directory schema is independent from any values that the object instance may store.

20. A computer-readable medium as recited in claim 18, wherein the directory schema defines a plurality of object classes for a versioning aware directory.

21. A computer-readable medium as recited in claim 18, wherein the complex data type is an XML data type.

22. A computer-readable medium as recited in claim 18, wherein the first property is described by an XML string, the XML string being compatible with the complex data type.

23. A computer-readable medium as recited in claim 18, wherein the object instance is a first object instance, wherein the property is the first property comprising a particular number of data elements, and wherein the computer-executable instructions further comprise instructions for:

independent of directory schema modification:

(a) instantiating a second object instance of the content class, the second object comprising a second flexible attribute that is based on the complex data type;

(b) assigning a second property to the second flexible attribute, the second property having a different number of data elements than the first property; and

(c) wherein each data element in the first and second properties comprises data such neither the first or second properties contribute to data sparsity of a directory based on the directory schema.

24. A computer-readable medium as recited in claim 18, wherein the object instance is a first object instance, wherein the property is the first property, and wherein the computer-executable instructions further comprise instructions for:

without modifying the directory schema, instantiating a second object instance of the content class, the second object comprising a second flexible attribute that is based on the complex data type; and

assigning a second property to the second flexible attribute, the second property being completely independent of any operational or data characterisitics of the first property.

25. A computer-readable medium as recited in claim 24, wherein the first and second properties are described by respective XML strings that are compatible with the complex data type.

26. A directory schema data structure comprising:

a flexible attribute data field that indicates a data type, the complex data type being used to express various operational or data providing properties of the flexible attribute, the various operational or data providing properties being independent of the data type and independent of any modification to the directory schema; and

a flexible structural object content class comprising the flexible attribute.

27. A directory schema data structure as recited in claim 26, wherein the directory schema is independent from any values that an object instance comprising the flexible attribute may store.

28. A directory schema data structure as recited in claim 26, wherein the flexible attribute data field provides, independent of modification to the directory schema, for application instantiation of first and second objects based on the flexible attribute, the first and second objects being instantiated into a directory database based on the directory schema, the first object having a different number of data elements as compared to a number of data elements in the second object, the application instantiation not contributing to data sparsity of the directory database.

29. A computer-readable medium comprising a data structure as recited in claim 26.

30. A computer comprising a computer-readable medium comprising a structure as recited in claim 26.

31. In a distributed computing system, a computer comprising a computer-readable medium comprising a structure as recited in claim 26.

32. A server for extending a directory schema independent of schema modification, the server comprising:

processing means for:

instantiating an object instance of a content class comprising a flexible attribute that is based on a complex data type, the content class and flexible attribute being defined in a directory schema; and

assigning a property to the attribute, the property being operational or data providing in nature, the property having a data type that is independent of the complex data type.

33. A server as recited in claim 32, wherein the directory schema is independent from any values that the object instance may store.

34. A server as recited in claim 32, wherein the complex data type is an XML data type.

35. A server as recited in claim 32, wherein the first property is described by an XML string, the XML string being compatible with the complex data type.

36. A server as recited in claim 32, wherein the first property is described by an XML string, the XML string being compatible with the complex data type.

37. A server as recited in claim 32, wherein the directory schema defines a plurality of object classes for a versioning aware directory.

38. A server as recited in claim 32, wherein the object instance is a first object instance, wherein the property is the first property comprising a particular number of data elements, and wherein the server further comprises processing means for:

independent of directory schema modification:

(a) instantiating a second object instance of the content class, the second object comprising a second flexible attribute that is based on the complex data type;

(b) assigning a second property to the second flexible attribute, the second property having a different number of data elements than the first property; and

(c) wherein each data element in the first and second properties comprises data such neither the first or second properties contribute to data sparsity of a directory based on the directory schema.

39. A server as recited in claim 32, wherein the object instance is a first object instance, wherein the property is the first property, and wherein the server further comprises processing means for:

independent of modification to the directory schema, instantiating a second object instance of the content class, the second object comprising a second flexible attribute that is based on the complex data type; and

assigning a second property to the second flexible attribute, the second property being completely independent of any operational or data characteristics of the first property.

40. A server as recited in claim 39, wherein the first and second properties are described by respective XML strings that are compatible with the complex data type.